

REMARKS

Favorable reconsideration and allowance of the claims of the present application are respectfully requested.

Before addressing the specific grounds of rejection raised in the outstanding Office Action, applicants have amended Claims 1 and 10, cancelled Claims 4, 5 and 13 and have added new Claim 17.

Insofar as the amendment made to Claims 1 and 10 is concerned, applicants have limited the recited gate dielectrics to those selected from the group consisting of HfO_2 , ZrO_3 , Y_2O_3 , silicates or nitrogen additions of HfO_2 , ZrO_3 , or Y_2O_3 , and mixtures thereof. The amendment to Claims 1 and 10 necessitated the cancellation of Claims 4, 5 and 13. New Claim 17 was derived from Claim 1.

Since the above amendments to the claims do not introduce new matter into the specification of the instant application, entry thereof is respectfully requested.

Claims 1, 2, 4, 7-11 and 14-16 stand rejected under 35 U.S.C. § 103 as allegedly unpatentable over U.S. Patent No. 6,300,208 to Talwar et al. ("Talwar et al.") in view of U.S. Patent No. 6,248,673 to Huang ("Huang"). Claims 1, 2, 4, 7-11 and 13-16 stand rejected under 35 U.S.C. § 103 as allegedly unpatentable over the combined disclosures of U.S. Patent Application Publication No. 2001/0032995 to Maria et al. ("Maria et al."), Talwar et al. and Huang.

Applicants respectfully submit that the combination of Talwar et al. and Huang do not render the claims of the present application obvious since none of the applied references teach or suggest applicants' claimed structures. Specifically, the combination of Talwar et al. and Huang do not teach or suggest a semiconductor structure including a gate stack of Re and a gate

dielectric selected from the group consisting of HfO_2 , ZrO_3 , Y_2O_3 , silicates or nitrogen additions of HfO_2 , ZrO_3 , or Y_2O_3 , and mixtures thereof. In Talwar et al., gate dielectric 8 is composed of silicon oxide, silicon nitride, aluminum oxide, titanium oxide, barium strontium oxide and tantalum oxide. Huang discloses a structure in which the gate dielectric is comprised of silicon oxide, silicon nitride and silicon oxynitride. The combination of Talwar et al. and Huang do not teach or suggest the claimed structures which include a gate dielectric on a semi-conducting substrate, said gate dielectric is selected from the group consisting of HfO_2 , ZrO_3 , Y_2O_3 , silicates or nitrogen additions of HfO_2 , ZrO_3 , or Y_2O_3 , and mixtures thereof; and a gate formed of a metal comprising Re on top of said gate dielectric, said gate comprising Re has an interface trapped charge density of about $3 \times 10^{10} \text{ cm}^{-2} \text{ eV}^{-1}$ to about $4 \times 10^{10} \text{ cm}^{-2} \text{ eV}^{-1}$.

At best, the combination of Talwar et al. and Huang would disclose a structure including one of silicon oxide, silicon nitride, silicon oxynitride, aluminum oxide, titanium oxide, barium strontium oxide and tantalum oxide as the gate dielectric material.

Applicants submit that each gate electrode- high k combination will have it's own issues and the key is to obtain properties similar to the poly-Si - silicon oxynitride combination (conventional gate stack) with the benefit of the high dielectric constant. It is not at all obvious that a certain combination will work, hence gate dielectrics are not interchangeable. To illustrate that not all high-k gate dielectrics are interchangeable, applicants submit the following reference "Advanced high-k dielectrics stacks with polySi and metal gates: Recent process and current challenges", IBM, J. Res. and Dev., Vol 50, No. 4/5 July/September 2006 (See Exhibit A).

In view of the above, the combined disclosures of Talwar et al. and Huang do not render the claimed structures obvious.

With respect to the combined disclosures of Maria et al., Talwar et al. and Huang, applicants submit that this combination of applied references does not render the claimed structures obvious. Specifically, the combined disclosures of Maria et al., Talwar et al. and Huang do not teach or suggest a semiconductor structure including a gate dielectric on a semi-conducting substrate, said gate dielectric is selected from the group consisting of HfO_2 , ZrO_3 , Y_2O_3 , silicates or nitrogen additions of HfO_2 , ZrO_3 , or Y_2O_3 , and mixtures thereof; and a gate formed of a metal comprising Re on top of said gate dielectric, said gate comprising Re has an interface trapped charge density of about $3 \times 10^{10} \text{ cm}^{-2} \text{ eV}^{-1}$ to about $4 \times 10^{10} \text{ cm}^{-2} \text{ eV}^{-1}$.

Maria et al. discloses lanthanum oxide or lanthanum silicates as gate dielectrics. The lanthanum-containing gate dielectrics are used in place of silicon oxide. Talwar et al. discloses a gate dielectric which is composed of silicon oxide, silicon nitride, aluminum oxide, titanium oxide, barium strontium oxide and tantalum oxide. Huang discloses a structure in which the gate dielectric is comprised of silicon oxide, silicon nitride and silicon oxynitride. The combination of Maria et al., Talwar et al. and Huang do not teach or suggest the claimed structures which include a gate dielectric on a semi-conducting substrate, said gate dielectric is selected from the group consisting of HfO_2 , ZrO_3 , Y_2O_3 , silicates or nitrogen additions of HfO_2 , ZrO_3 , or Y_2O_3 , and mixtures thereof; and a gate formed of a metal comprising Re on top of said gate dielectric, said gate comprising Re has an interface trapped charge density of about $3 \times 10^{10} \text{ cm}^{-2} \text{ eV}^{-1}$ to about $4 \times 10^{10} \text{ cm}^{-2} \text{ eV}^{-1}$.

At best, the combination of Maria et al., Talwar et al. and Huang would disclose a structure including one of lanthanum oxide, lanthanum silicate, silicon oxide, silicon nitride, silicon oxynitride, aluminum oxide, titanium oxide, barium strontium oxide and tantalum oxide as the gate dielectric material.

The various § 103 rejections also fail because there is no motivation in the applied references which suggest modifying the disclosed structures to include the various elements, as presently recited in the claims of the present application. Thus, there is no motivation provided in the applied references, or otherwise of record, to make the modification mentioned above. "The mere fact that the prior art may be modified in the manner suggested by the Examiner does not make the modification obvious unless the prior art suggested the desirability of the modification." In re Vaeck, 947 F.2d, 488, 493, 20 USPQ 2d. 1438, 1442 (Fed.Cir. 1991).

The rejections under 35 U.S.C. § 103 have been obviated; therefore reconsideration and withdrawal thereof is respectfully requested.

Thus, in view of the foregoing amendments and remarks, it is firmly believed that the present case is in condition for allowance, which action is earnestly solicited.

Respectfully submitted,



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